

Appl. No. 10/698,988  
Amdt. Dated September 26, 2005

Attorney Docket No.: NSL-014  
Reply to Office Action of July 26, 2005

**REMARKS:****AMENDMENTS TO THE CLAIMS**

To expedite prosecution, the Applicants have canceled claims 1-11 without prejudice. The Applicants reserve the right to pursue of the subject matter of these claims in a later-filed recite  
5 divisional application. New claim 28 has been added to recite that adjacent layers of the organic polymer material and inorganic material are covalently bonded to each other at an interface between organic and inorganic materials. The Applicants submit that support for this feature can be found in the specification at page 7, lines 1-3 and as set forth below. The Applicant submits that entry of this amendment is proper since claim 28 depends from claim 12 and claim 12 is  
10 believed to be allowable as it presently stands.

**SPECIFICATION OBJECTIONS**

The Examiner has objected to the amendment to the specification under 35 USC 132(a) for introducing new matter. In response, the Applicants submit that no new matter has been entered. The specification was amended to explicitly recite material that had been incorporated by  
15 reference from US Patent 6,264,741. Support for these features can be found in US Patent 6,264,741, e.g., at column 5, lines 39-46, column 6, lines 38-56, at column and at column 8, lines 6-7.

According to 37 CFR 1.57(b)

- 20 an incorporation by reference must be set forth in the specification and must:
- (1) Express a clear intent to incorporate by reference by using the root words "incorporat(e)" and "reference" (e.g., "incorporate by reference"); and
  - (2) Clearly identify the referenced patent, application, or publication.

In the present case, the entirety of US Patent 6,264,741 was incorporated by reference in the into  
25 the application as filed using the following words: "Self-assembly of nanocomposite materials using sol-gel techniques is described, e.g., in U.S. Patent 6,264,741 to Brinker et al., the entire contents of which are incorporated by reference." (see page 4, line 29 to page 5, line 2). The Applicants submit that this language expresses a clear intent to incorporate by reference and clearly identifies US Patent 6,264,741 by its patent number and first named inventor.

30 In addition, according to 37 CFR 1.57(c):

- (c) "Essential material" may be incorporated by reference, but only by way of an incorporation by reference to a U.S. patent or U.S. patent application publication, which patent or patent application publication does not itself incorporate such essential material by reference.

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Even if, arguendo, the subject matter in question represents "essential matter" the Applicants submit that the incorporation by reference is proper since US Patent 6,264,741 does not incorporate the subject matter by reference.

- 5 Furthermore, according to MPEP 2163.07(b) information incorporated by reference "is as much a part of the application as filed as if the text was repeated in the application, and should be treated as part of the text of the application as filed *Replacing the identified material incorporated by reference with the actual text is not new matter.*" (Emphasis added)

- To the extent that the amendment involves a rephrasing of the subject matter incorporated from  
10 Brinker, the Applicants submit that MPEP 2163.07(I) clearly states that such rephrasing is not new matter.

For all of the foregoing reasons, the Applicants respectfully request that the new matter rejection be withdrawn.

#### CLAIM REJECTIONS

15 35 USC 112

- Claims 25-26 were rejected under 35 USC 112, first paragraph for failing to comply with the written description requirement. In rejecting the claims, the Examiner states that the terms "lamellae" in claim 25 and "tubules" in claim 26 are not discussed in the specification. The Applicants respectfully traverse the rejections. For the reasons discussed above with respect to  
20 the objection to the specification amendments, the Applicants submit that the subject matter of claims 25 and 26 has been properly incorporated by reference into the specification and was present in the specification as of its filing date.

- In addition, in an interview with attorney of record Joshua D. Isenberg and inventor Brian M. Sager on September 20, 2005, the Examiner indicated that these arguments would overcome the  
25 both new matter objections to the specification and the above claim rejections under 35 USC 112.

35 USC 102

- Claims 12-14, 20-21, 23-25 and 27 were rejected under 35 USC 102(b) as being anticipated by US Patent 6,472,467 B1 to Chiao (hereinafter Chiao). In rejecting the claims the Examiner states  
30 that Chiao teaches a laminate film having multiple layers or lamellae wherein the adjacent layers

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of the film are covalently bonded to each other. The Examiner states that Chiao discloses that the layers of the coating include a crosslinker, Chiao discloses simultaneous crosslinking of the multiple layers because crosslinking occurs by chemical reaction. The Examiner argues that, by teaching that the crosslinking occurs by chemical reaction, Chiao teaches covalent bonding. The  
5 Examiner further argues that because Chiao teaches that each layer is made of an organic polymer and inorganic particles having a size of 5 nanometers Chiao teaches that each layer is an organic layer and an inorganic layer.

The Applicants respectfully traverse the rejections. The Applicant submits that the Examiner's interpretation of claim 12 as reading on layers that contain both organic and inorganic material is  
10 inconsistent with the language of the claim as it presently stands. Claim 12 recites covalent bonding between a layer of organic polymer material and an adjacent layer of inorganic material. The Applicants submits that it is clear from the language of claim 12 that even if, arguendo, the layers include both organic and inorganic materials, the bonding occurs between organic and inorganic *materials*. The Applicants further submit that this interpretation of claim 12 is  
15 consistent with the specification as originally filed. Specifically, page 7, lines 1 to 3 which state "The resulting nanocomposite structure in the multi-layer film is stabilized by (a) organic polymerization, (b) inorganic polymerization, and (c) covalent bonding at the organic interfacial surfaces." (Emphasis added). The Applicants submit that it is clear from Brinker, which has been incorporated into the present application by reference that the covalent bonding occurs at  
20 interfaces between organic and inorganic materials (see Brinker col. 5, lines 30-35).

The Applicants submit that Chiao is devoid of any such teaching or suggestion. Instead, Chiao describes an inorganic/organic composition in which inorganic particulate material is mixed with a cross-linkable organic material. Chiao specifically teaches applying heat or UV-light to a cross-link the organic material (see e.g., col. 2, lines 23-29). Chiao does not teach or suggest that  
25 this cross-linking results in organic bonding between the organic cross-linker and the inorganic particulates. Thus, the covalent bonding in Chiao appears to occur only amongst the organic material.

Further, the Applicants submit that the Examiner's use of the word nanolaminate to describe the organic/inorganic composite material of Chiao is inappropriate. Please note that Chiao et al do  
30 not use the term "laminate" or "nanolaminate" in describing the inorganic/organic compositions they disclose. The Applicant submits that a nanolaminate refers to a laminate on the scale of a

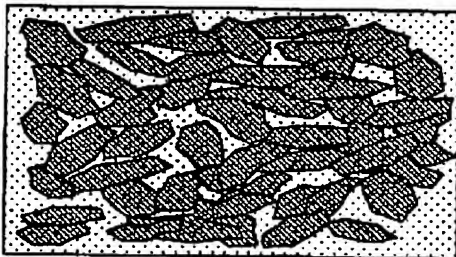
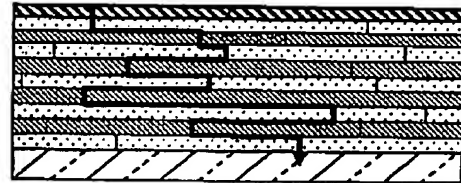
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nm. The Merriam-Webster Online Dictionary defines a "laminate" to refer to a product made by laminating. (see <http://www.m-w.com/cgi-bin/dictionary?book=Dictionary&va=laminate>)

The same source defines "laminating" to mean "a : to make (as a windshield) by uniting superposed layers of one or more materials b : to unite (layers of material) by an adhesive or other means". (see <http://www.m-w.com/cgi-bin/dictionary?book=Dictionary&va=laminating>)

The Applicant further submits that in view of the foregoing discussion, the composition Chiao describes is not a nanolaminate formed of layers of organic and inorganic material covalently bonded to each other as set forth in claim 12. As an illustration of the distinction, the Applicant submits the drawings on the following page. Drawing A on the left shows inorganic particles (light cross-hatched shading) embedded in an organic cross-linker (dotted shading) as taught by Chiao. Drawing B on the right, which is a partial reproduction of FIG. 1 of the present application, illustrates a nanolaminate having layers of organic polymer material (dotted shading) that alternate with layers of inorganic material (light cross-hatching).

**A****B**

15 The Applicant submits that the definitions and drawings above clearly illustrate the following distinctions between Chiao and claim 12.

1. Chiao does not teach a nanolaminate since Chiao does not teach a material formed by uniting superposed layers of one or more materials.
2. Chiao does not teach a composition in which layers of organic material are covalently bonded to adjacent layers of inorganic material.

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With respect to the first point, the Applicants submit that the word "*layer*" has a well-defined meaning to those of skill in the art. Specifically:

"single thickness of usually some homogeneous substance" from  
[wordnet.princeton.edu/perl/webwn](http://wordnet.princeton.edu/perl/webwn)

5 "one thickness, course, or fold laid or lying over or under another" from <http://www.m-w.com/cgi-bin/dictionary?book=Dictionary&va=layer>

"A single thickness of a material covering a surface or forming an overlying part or segment:"  
from <http://dictionary.reference.com/search?q=layer>

10 "flat covering over or between others: a single thickness of something that lies over or under something or between other similar thicknesses" from  
<http://encarta.msn.com/encnet/features/dictionary/DictionaryResults.aspx?refid=1861625296>

"A single thickness of a material covering a surface or forming an overlying part or segment"  
See The American Heritage® Dictionary of the English Language: Fourth Edition. 2000.

15 "That which is laid; a stratum; a bed; one thickness, course, or fold laid over another; as, a layer of clay or of sand in the earth; a layer of bricks, or of plaster; the layers of an onion." See Webster dictionary <http://machaut.uchicago.edu/cgi-bin/WEBSTER.sh?WORD=layer>.

The Applicant submits that the while the Examiner's interpretation of the claims may be broad, it must also be a *reasonable* interpretation (see MPEP 2111.01). The Applicants submit that the Examiner's interpretation of claim 12 as reading upon Chiao is not a reasonable one. The  
20 Examiner has argued that Chiao teaches a coating having multiple layers where each layer is both an organic layer and an inorganic layer. The plain language of claim 12 speaks of two distinct overlapping single thicknesses of material, namely a layer of organic polymer material and a layer of inorganic material, laid one over the other. In order for claim 12 to read on Chiao as the Examiner has argued there must be some teaching in Chiao of multiple layers. However,  
25 Chiao's coatings are not described as being made up of multiple layers. Instead, Chiao cites five different examples of coatings formed from solutions. In each case a solution was spin coated onto a substrate and then cross-linked by heating. See col. 9, line 25 to col. 10, line 60. Chiao never mentions spin coating a solution onto an already coated substrate or performing multiple spin coating steps with different solutions or anything else that would teach or suggest a multiple  
30 layer coating.

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Furthermore, the Applicants submit that these are not trivial distinctions. The mixing described by Chiao is relatively crude, since the mixing resolution is set by the size of the nanoparticles and any attached organic shell to the surface of the nanoparticles, there is no interconnectivity of organic and inorganic components. Covalent bonding of adjacent organic and inorganic layers, by contrast, can lead to complete and continuous interconnectivity of the inorganic and organic materials at the molecular scale, with no exclusion of significant volumes of inorganic material from the interconnectivity. This is a critical structural difference, in that the water and oxygen barrier properties are set in large part by the degree to which the vapor ingress path is tortuous. A smaller scale of interconnectivity generally leads to a greater length and complexity of the tortuous path, and, consequently, better barrier properties of the resulting nanolaminate film.

Therefore, for all the reasons set forth above, the Applicants submit that Chiao does not teach or suggest an inorganic/organic hybrid nanolaminate barrier film having all the features set forth in claim 12 and the article of manufacture set forth in claim 23. As such, a prima facie case of anticipation is not present and claim 12 defines an invention suitable for patent protection. In addition, claims 13-14, 20-21 and 27 depend either directly or indirectly from claim 12 and recite additional features therefore. Similarly claims 24-25 depend from claim 23 and recite additional features therefore. As such, and for the same reasons set forth above, the Applicants submit that Chiao does not anticipate these dependent claims, which define an invention suitable for patent protection.

#### 35 USC 103

Claims 16-17 were rejected under 35 USC 103(a) as being obvious over Chiao in view of WO 00/78540 to Singh et al (hereinafter Singh). In addition, claim 15 was rejected as being obvious over Chiao in further view of US Patent 6,818,163 to Fibiger et al. (hereinafter Fibiger). Also, claims 18-19 were rejected as being obvious over Chiao in view of US Patent 5,372,888 to Ogawa (hereinafter Ogawa). Furthermore, claims 22 and 26 were rejected as being obvious over Chiao in further view of US Patent 6,264,741 to Brinker et al. (hereinafter Brinker). The applicants respectfully traverse the rejections.

For the reasons set forth above, the applicants submit that Singh does not teach all the features of claim 12. The Examiner has pointed to no teaching in Fibiger, Ogawa or Brinker, either alone or in combination with Chiao tending to teach or suggest all the features of claim 12. As such, no combination of Singh with Fibiger, Ogawa, Brinker or skill in the art teaches or suggests all the

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features of claim 12 and a prima facie case of obviousness is not present. Furthermore claims 15-19, 22 and 26 all depend from claim 12 and recite additional features therefor. As such, and for the same reasons set forth above the applicants submit that these dependent claims define an invention suitable for patent protection.

5 NEW CLAIM 28

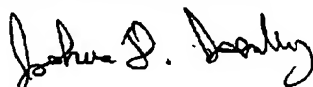
The Applicants submit that new claim 28 depends directly from claim 12 and is allowable over the prior art and is allowable for the reasons set forth above. In addition, Chiao does not teach or suggest covalent bonding between an organic polymer and an inorganic material at an interface between them as set forth in claim 28. As such, and for at least this additional reason, the

10 Applicants submit that claim 28 defines an invention suitable for patent protection.

CONCLUSION

For the reasons set forth above, the Applicants submit that all claims are allowable over the cited art and define an invention suitable for patent protection. The Applicants therefore respectfully request that the Examiner enter the amendment, reconsider the application, and issue a Notice of  
15 Allowance in the next Office Action.

Respectfully submitted,



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